

Thermocouples Model TC200, for Additional Thermowell

WIKA Data Sheet TE 65.10



Applications

- Machinery, plant and tank construction
- Energy and power plant technology
- Chemical industry
- Food and beverage industry
- Sanitary, heating and air-conditioning technology

Special Features

- Application ranges from 0 °C to +1200 °C
- Suitable for all standard thermowell designs
- Measuring insert exchangeable
- Intrinsically safe versions (ATEX)

Description

Thermocouples in this series can be combined with a large number of thermowell designs. Operation without thermowell is only recommended for specific applications.

An extensive range of sensors, connection heads, insertion lengths, neck lengths, thermowell connections etc. are available for these thermometers, so that they are suitable for all thermowell dimensions and applications.

Intrinsically safe designs are available for applications in hazardous areas. The models of the TC200 series are provided with a type-examination certificate for "intrinsically safe" type of protection according to directive 94/9/EC (ATEX), EEx-i, for gases and dust.

Manufacturer's Declarations in accordance with EN 50 020 are also available.

Optionally we can fit analogue or digital transmitters from the WIKA range into the connection head of the TC200.



**Thermocouples for Additional Thermowell
Model TC200**

Sensor

Sensor type

Type	Recommended max. operating temperature
K (NiCr-Ni)	1200 °C
J (Fe-CuNi)	800 °C
E (NiCr-CuNi)	800 °C
T (Cu-CuNi)	400 °C
N (NiCrSi-NiSi)	1200 °C

In the case of type K there is a risk of blue mould between 850 °C and 950 °C. We recommend the use of a sensor type N, if the working temperature fluctuates continuously in this range.

The application range of these thermometers is limited by the permissible max. temperature of the thermocouple as well as the max. temperature of the thermowell material.

Listed sensor types are available both as simplex or duplex thermocouples.

The measuring point (hot junction) of the probe is supplied as ungrounded unless specified otherwise.

Sensor limiting error

A cold junction temperature of 0 °C is taken as basis with the definition of the sensor limiting error of thermocouples.

Type K

Class	Temperature range	Limiting error
DIN EN 60584 part 2		
1	-40 °C ... +375 °C	± 1.5 °C
1	+375 °C ... +1000 °C	± 0.0040 • t ¹⁾
2	-40 °C ... +333 °C	± 2.5 °C
2	+333 °C ... +1200 °C	± 0.0075 • t ¹⁾
ISA (ANSI) MC96.1-1982		
Standard	0 °C ... +1250 °C	± 2.2 °C or ²⁾ ± 0.75 %
Special	0 °C ... +1250 °C	± 1.1 °C or ²⁾ ± 0.4 %

Type J

Class	Temperature range	Limiting error
DIN EN 60584 part 2		
1	-40 °C ... +375 °C	± 1.5 °C
1	+375 °C ... +750 °C	± 0.0040 • t ¹⁾
2	-40 °C ... +333 °C	± 2.5 °C
2	+333 °C ... +750 °C	± 0.0075 • t ¹⁾
ISA (ANSI) MC96.1-1982		
Standard	0 °C ... +750 °C	± 2.2 °C or ²⁾ ± 0.75 %
Special	0 °C ... +750 °C	± 1.1 °C or ²⁾ ± 0.4 %

Type E

Class	Temperature range	Limiting error
DIN EN 60584 part 2		
1	-40 °C ... +375 °C	± 1.5 °C
1	+375 °C ... +800 °C	± 0.0040 • t ¹⁾
2	-40 °C ... +333 °C	± 2.5 °C
2	+333 °C ... +900 °C	± 0.0075 • t ¹⁾

Type T

Class	Temperature range	Limiting error
DIN EN 60584 part 2		
1	-40 °C ... +125 °C	± 0.5 °C
1	+125 °C ... +350 °C	± 0.0040 • t ¹⁾
2	-40 °C ... +133 °C	± 1.0 °C
2	+133 °C ... +350 °C	± 0.0075 • t ¹⁾

Type N

Class	Temperature range	Limiting error
DIN EN 60584 part 2		
1	-40 °C ... +375 °C	± 1.5 °C
1	+375 °C ... +1000 °C	± 0.0040 • t ¹⁾
2	-40 °C ... +333 °C	± 2.5 °C
2	+333 °C ... +1200 °C	± 0.0075 • t ¹⁾

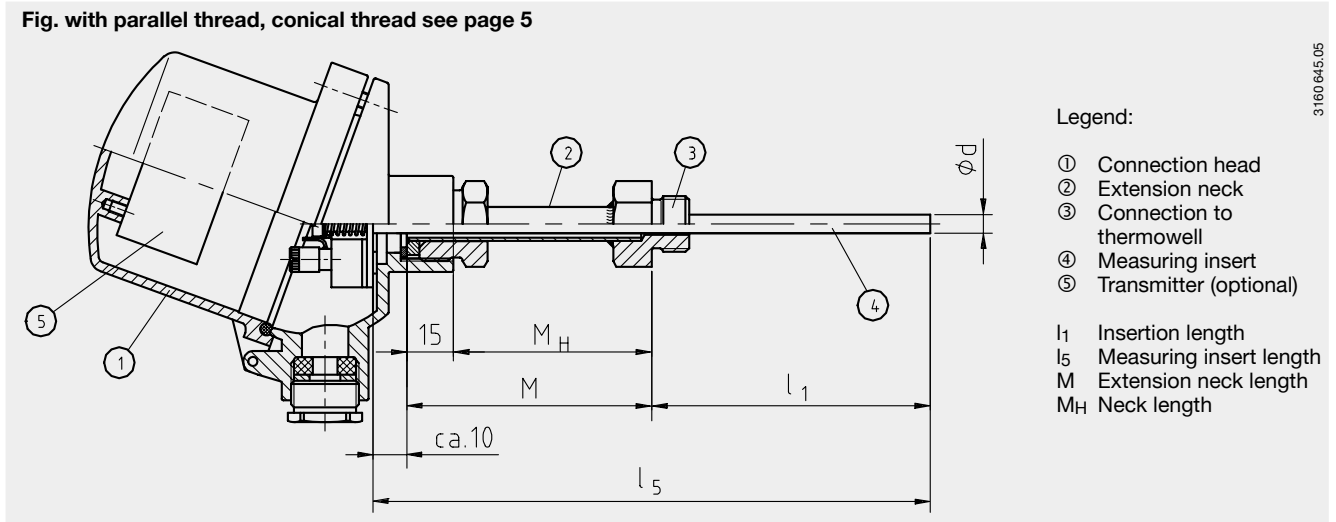
1) |t| is the value of the temperature in °C without consideration of the sign
2) Whichever is larger.

Limiting error with selected temperatures in °C for thermocouples type K and type J

Temperature (ITS 90) °C	Limiting error DIN EN 60584	
	Class 1 °C	Class 2 °C
0	± 1.5	± 2.5
100	± 1.5	± 2.5
200	± 1.5	± 2.5
300	± 1.5	± 2.5
400	± 1.6	± 3
500	± 2	± 3.75
600	± 2.4	± 4.5
700	± 2.8	± 5.25
800	± 3.2	± 6
900	± 3.6	± 6.75
1000	± 4	± 7.5
1100	± 4.4	± 8.25
1200	± 4.8	± 9

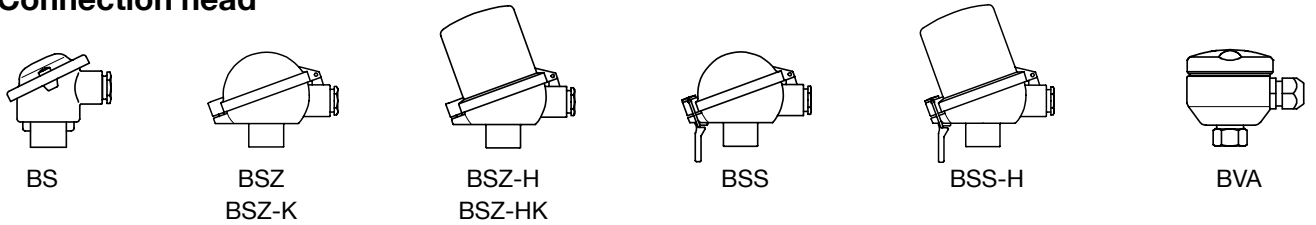
TC200 components

Fig. with parallel thread, conical thread see page 5



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Connection head



Model	Material	Cable entry	Ingress protection	Cap	Surface finish
BS	aluminium	M20 x 1.5	IP 65	cap with 2 screws	silver bronze, painted
BSZ	aluminium	M20 x 1.5	IP 65	flap cap with screw	silver bronze, painted
BSZ-K	plastic	M20 x 1.5	IP 65	flap cap with screw	blank
BSZ-H	aluminium	M20 x 1.5	IP 65	flap cap with screw	silver bronze, painted
BSZ-HK	plastic	M20 x 1.5	IP 65	flap cap with screw	blank
BSS	aluminium	M20 x 1.5	IP 65	flap cap with clip	silver bronze, painted
BSS-H	aluminium	M20 x 1.5	IP 65	flap cap with clip	silver bronze, painted
BVA	stainless steel	M20 x 1.5	IP 65	screw cover	blank

Connection head with digital indicator (option)

As an optional alternative to the standard connection head the thermometer may be equipped with the digital indicator DIH10. The connection head used in this case is similar to the head model BSZ-H. For operation a 4 ... 20 mA transmitter is necessary, which is mounted to the measuring insert. The scale range of the indicator is configured identical to the measuring range of the transmitter. Intrinsically safe versions, explosion protection type EEx (i), are also available.



Fig. Connection head with digital indicator, Model DIH10

Transmitter (option)

Depending on used connection head a transmitter can be mounted into the thermometer.

- mounted instead of terminal block
- mounted within the cap of the connection head
- mounting not possible

Mounting of two transmitters on request.

Connection head	Transmitter					
	T12	T19	T24	T32	T42	T53
BS	–	○	○	–	–	○
BSZ / BSZ-K	○	○	○	○	○	○
BSZ-H / BSZ-HK	●	●	●	●	●	●
BSS	○	○	○	○	○	○
BSS-H	●	●	●	●	●	●
BVA	○	○	○	○	○	○

Model	Description	Explosion protection	Data sheet
T19	Analogue transmitter, configurable	without	TE 19.01
T24	Analogue transmitter, PC configurable	optional	TE 24.01
T12	Digital transmitter, PC configurable	optional	TE 12.01
T32	Digital transmitter, HART protocol	optional	TE 32.01
T42	Digital transmitter, PROFIBUS PA	optional	TE 42.01
T53	Digital transmitter FOUNDATION Fieldbus and PROFIBUS PA	standard	TE 53.01

Extension neck

The extension neck is screwed to the connection head. The usual size to industrial standards is M 24 x 1.5 mm. The length of the extension neck depends on the application. Generally the extension neck serves for the bridging of an insulation. In many applications it is also used as a part cooling element between connection head and medium in order to protect any head mount transmitters from high medium temperatures. Standard material of the extension neck is stainless steel.

Measuring insert

The measuring insert is made of a vibration-resistant sheathed measuring cable (MI cable). The diameter of the measuring insert shall be approx. 1 mm smaller than the hole diameter of the thermowell. Gaps of more than 0.5 mm between thermowell and measuring insert will have a negative effect on the heat transfer, and they will result in an unfavourable response behaviour of the thermometer.

When fitting the measuring insert with a thermowell, it is very important to determine the correct insertion length (= thermowell length with thermowell bottom thicknesses of < 6 mm). In this connection the fact that the measuring insert is spring-loaded (spring travel: max. 10 mm) has to be taken into account in order to ensure that the measuring insert presses against the bottom of the thermowell. Furthermore we recommend that a neck length be selected to give a standard length for the thermometer's measuring insert. This has the advantage that a measuring insert of the standard series can be used.

Standard measuring insert length

Measuring insert Ø in mm	Standard measuring insert length in mm											
	275	315	345	375	405	435	525	555	585	655	735	
3	275	315		375		435						
6	275	315	345	375	405	435	525	555	585	655	735	
8	275	315	345	375	405	435	525	555	585	655	735	

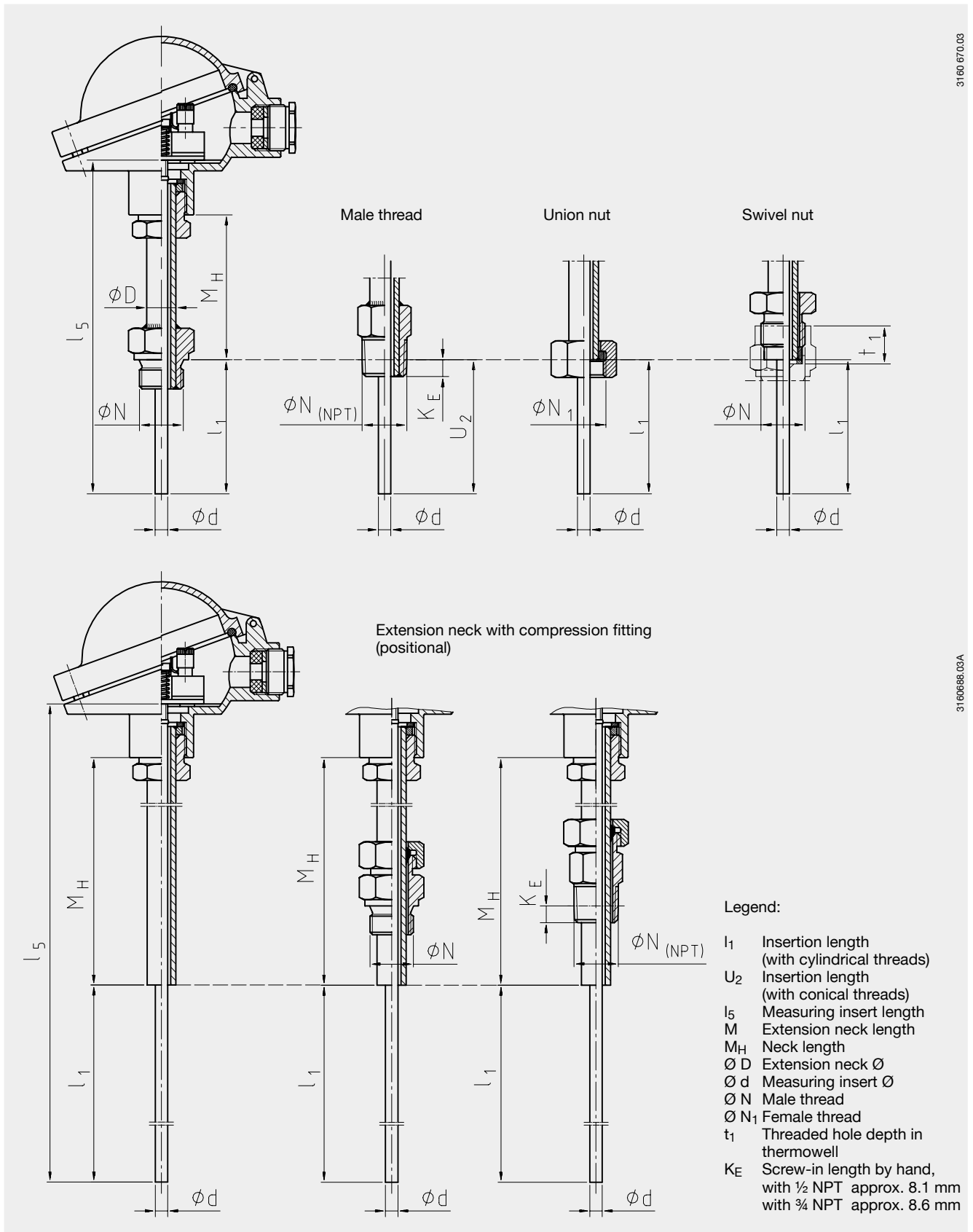
The lengths specified in this table correspond to the standard lengths. Intermediate lengths or excess lengths are possible without any problems.

Possible combinations of design, extension neck diameter and connection thread

Design of the screw connection at the extension neck	Connection thread at extension neck			Connection thread to the head
	Ø 11 mm	Ø 12 mm	Ø 14 mm	
Male thread	G ½ B	–	G ½ B	M 24 x 1.5
	G ¾ B	–	G ¾ B	M 24 x 1.5
	M 14 x 1.5	–	–	M 24 x 1.5
	M 18 x 1.5	–	M 18 x 1.5	M 24 x 1.5
	½ NPT	–	½ NPT	M 24 x 1.5
	¾ NPT	–	¾ NPT	M 24 x 1.5
Union nut	G ½	–	G ½	M 24 x 1.5
	M 27 x 2	–	M 27 x 2	M 24 x 1.5
Swivel nut	G ½ B	–	G ½ B	M 24 x 1.5
Extension neck without thread	–	–	–	M 24 x 1.5
Extens. neck with compression fitting	–	G ½ B	G ½ B	M 24 x 1.5
	–	M 27 x 2	M 27 x 2	M 24 x 1.5

Connection to thermowell

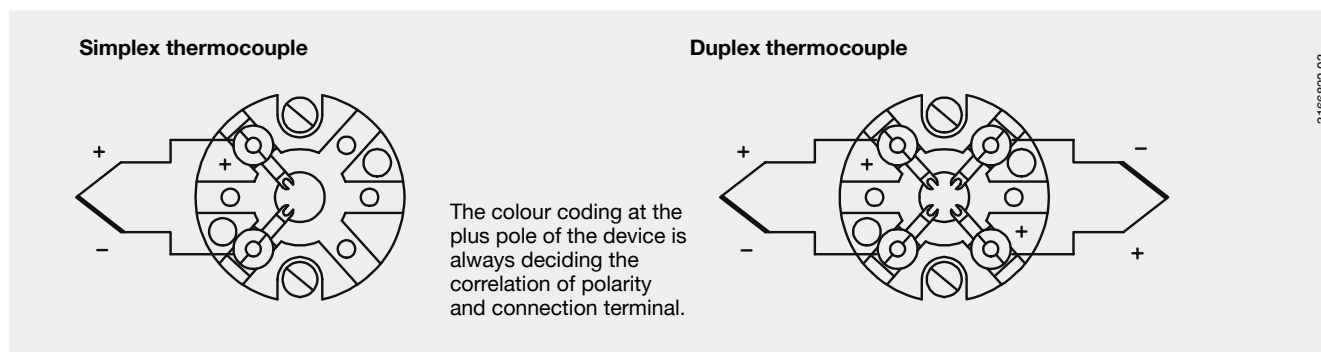
The many possible designs ensure that the thermocouple, Model TC200, can be combined with almost all feasible thermowells. The most usual designs of connection are shown in the following drawings. Others are available on request.



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31 60686.03A

Electrical connection



Explosion protection (option)

Thermocouples TC200 are available with a type-examination certificate for "intrinsically safe" ignition protection (TÜV 02 ATEX 1793 X). These thermometers comply with the requirements of directive 94/9/EC (ATEX), EEx-i, for gases and dust.

Manufacturer's Declarations in accordance with EN 50 020 are also available.

The classification / suitability of the instrument (permissible power $P_{max.}$, minimum neck length and permissible ambient temperature) for the respective category can be seen from the type test certificate and the operating instructions.

Built-in transmitters have their own approval.

The permissible ambient temperature ranges of the built-in transmitters can be taken from the corresponding transmitter approval.

The responsibility for using suitable thermowells rests with the user.

Ordering information

Field No.	Code	Features
		Explosion protection
	Z	without
	Y	according to directive 94/9/EC (ATEX) EEx-i G for gases
	H	according to directive 94/9/EC (ATEX) EEx-i GD for gases und dust
1	K	according to directive 94/9/EC (ATEX) EEx-n
		Type and number of sensors
	A	1 x type K (NiCr-Ni)
	B	2 x type K (NiCr-Ni) ¹⁾
	C	1 x type J (Fe-CuNi)
	D	2 x type J (Fe-CuNi) ¹⁾
2	?	other <i>please state as additional text</i>
		Sensor limiting error
	2	class 2 per DIN EN 60 584
	1	class 1 per DIN EN 60 584
	8	ISA (ANSI) standard to MC96.1-1982
	9	ISA (ANSI) special to MC96.1-1982
3	?	other <i>please state as additional text</i>
		Measuring point
	1	insulated
4	2	not insulated
		Measuring insert diameter
	1	3 mm
	3	6 mm
	4	8 mm <i>tubing</i>
	5	10 mm <i>tubing</i>
5	?	other <i>please state as additional text</i>
		Insertion length
	0110	110 mm <i>results in combination with neck length 140 mm in a standard model</i>
	0140	140 mm <i>results in combination with neck length 150 mm in a standard model</i>
	0170	170 mm <i>results in combination with neck length 150 mm in a standard model</i>
	0200	200 mm <i>results in combination with neck length 150 mm in a standard model</i>
	0230	230 mm <i>results in combination with neck length 150 mm in a standard model</i>
	0260	260 mm <i>results in combination with neck length 150 mm in a standard model</i>
	0350	350 mm <i>results in combination with neck length 150 mm in a standard model</i>
	0410	410 mm <i>results in combination with neck length 150 mm in a standard model</i>
6		length in mm, e.g. 0850 for 850 mm
		Neck length
	4	140 mm
	5	150 mm
7	?	other <i>please state as additional text</i>
		Connection to thermowell / Extension neck diameter
	C1	male thread M 18 x 1.5 / diameter 11 mm <i>not with measuring insert-Ø 8 mm</i>
	B1	male thread M 14 x 1,5 / diameter 11 mm <i>not with measuring insert-Ø 8 mm</i>
	A1	male thread G 1/2 B / diameter 11 mm <i>not with measuring insert-Ø 8 mm</i>
	A3	male thread G 1/2 B / diameter 14 mm
	C3	male thread M 18 x 1,5 / diameter 14 mm
	E1	union nut M 27 x 2 / diameter 11 mm <i>not with measuring insert-Ø 8 mm</i>
	F1	union nut G 1/2 / diameter 11 mm <i>not with measuring insert-Ø 8 mm</i>
	E3	union nut M 27 x 2 / diameter 14 mm
	F3	union nut G 1/2 / diameter 14 mm
	G1	swivel nut G 1/2 B / diameter 11 mm <i>not with measuring insert-Ø 8 mm</i>
	G3	swivel nut G 1/2 B / diameter 14 mm
	H2	male union fitting / diameter 12 mm
	K2	extension neck without thread G 1/2 B, stainless steel / diameter 12 mm
8	??	other <i>please state as additional text</i>
		Connection from connection head to extension neck
	1	M24 x 1.5
9	?	other <i>please state as additional text</i>

Ordering information, continued

Field No.	Code	Features	
		Connection head	
	1	model BS (aluminium) <i>only transmitter T19 as option possible</i>	
	2	model BSZ (aluminium)	
	3	model BSZ-H (aluminium) <i>mounting of an optional transmitter in the cap possible</i>	
	T	model BSZ-K (plastic)	
	S	model BSZ-HK (plastic) <i>mounting of an optional transmitter in the cap possible</i>	
	4	model BSS (aluminium)	
	5	model BSS-H (aluminium) <i>mounting of an optional transmitter in the cap possible</i>	
	8	model BVA (stainless steel)	
	H	BSZ-H with digital temperature indicator DIH10 (set to transmitter range) <i>only without explosion protection, for use a transmitter (4...20 mA) is required</i>	
	J	BSZ-H with digital temperature indicator DIH10-Ex (set to transmitter range) <i>for use a transmitter (4...20 mA) in Ex-version is required</i>	
10		? other <i>please state as additional text</i>	
		Cable entry to connection head	
	4	M20 x 1.5	
11		? other <i>please state as additional text</i>	
		Transmitter	
	ZZ	without	
	TA	mounted on the measuring insert	
12		TB mounted in the cup of the connection head	
		Additional order info	
	YES	NO	
13	1	Z	quality certificates <i>see price list</i>
14	T	Z	additional text <i>Please state as clearly understandable text!!</i>

1) Duplex thermocouple in combination with 2 transmitters on request

Order code:

	1	2	3	4	5	6	7	8	9	10	11	12		13	14	
TC200 -	□	-	□	□	-	□	□	□	□	□	□	□	□	ZZ -	□	□

Additional text: _____

Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing. Modifications may take place and materials specified may be replaced by others without prior notice.



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